

FERN LIFE CYCLE

A DIFFERENT WAY OF REPRODUCING
FROM FLOWERING PLANTS

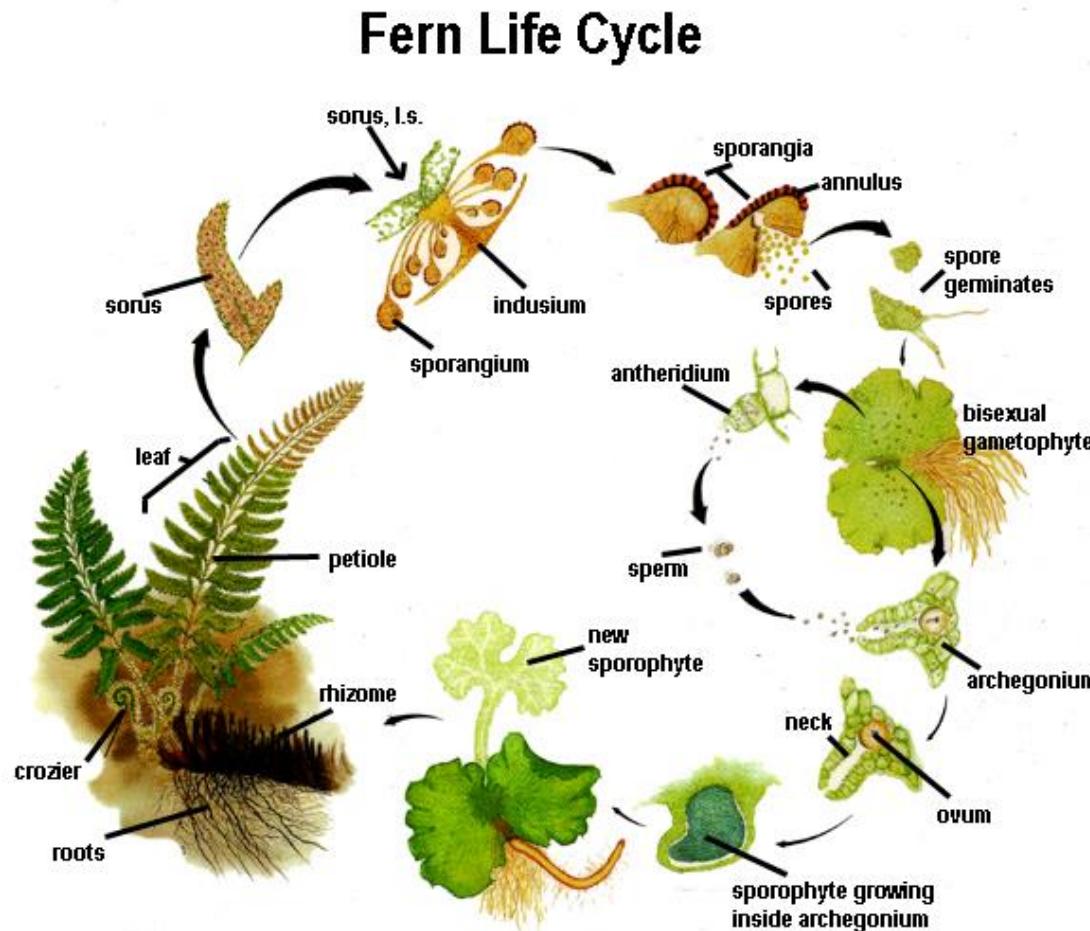
All non-seed plants reproduce from spores with an alternation of generations, an unfamiliar concept to most

- The two generations are:
- The diploid sporophyte plant that produces tiny, microscopic spores and
- The haploid gametophyte plant that produces eggs and sperms
- When an egg is fertilized by a sperm, the fertilized egg, now again diploid grows into
- A new sporophyte plant

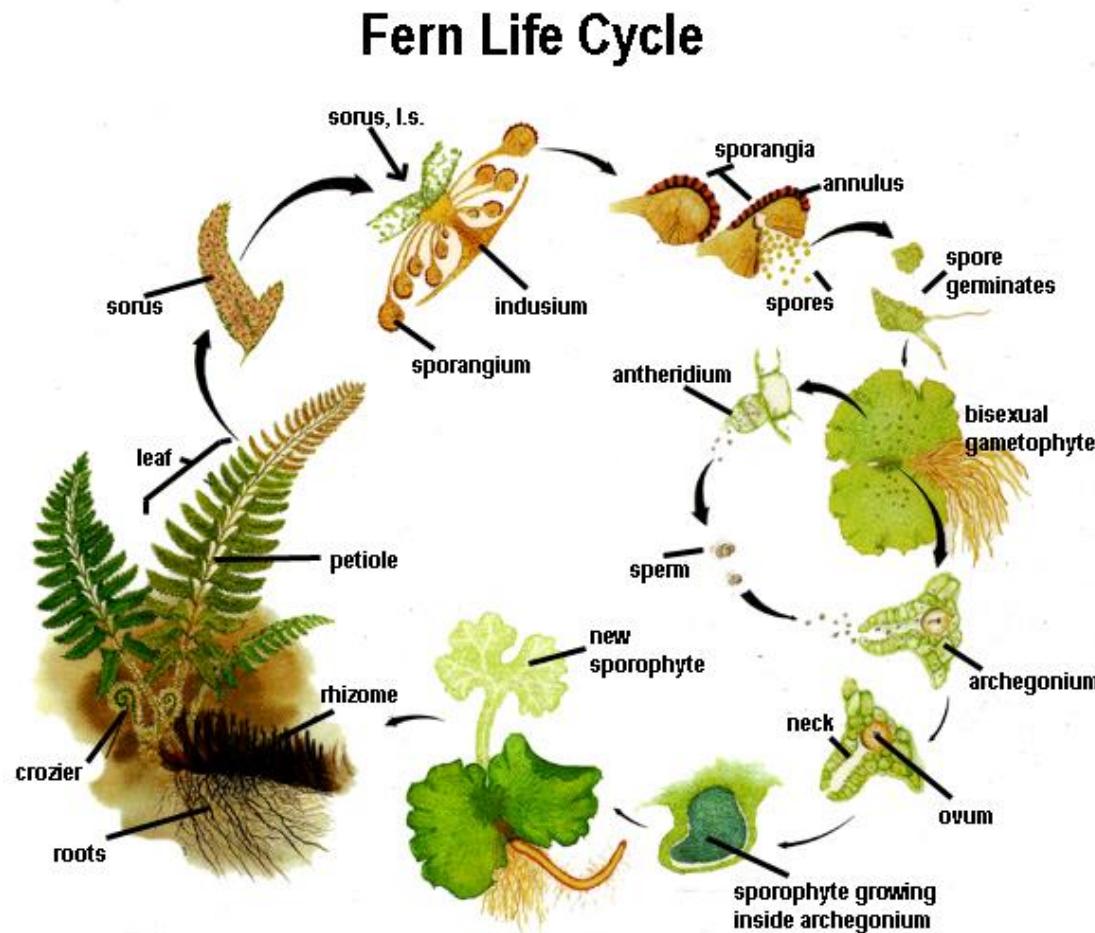
This basic life cycle is found in all non-seed producing plants including

- Mosses and liverworts,
- Horsetails (genus *Equisetum*),
- Lycophytes (genera *Lycopodium*, *Isoetes*, and *Selaginella*), and
- Ferns
- Details of the life cycles in these groups differ; we'll focus exclusively on ferns

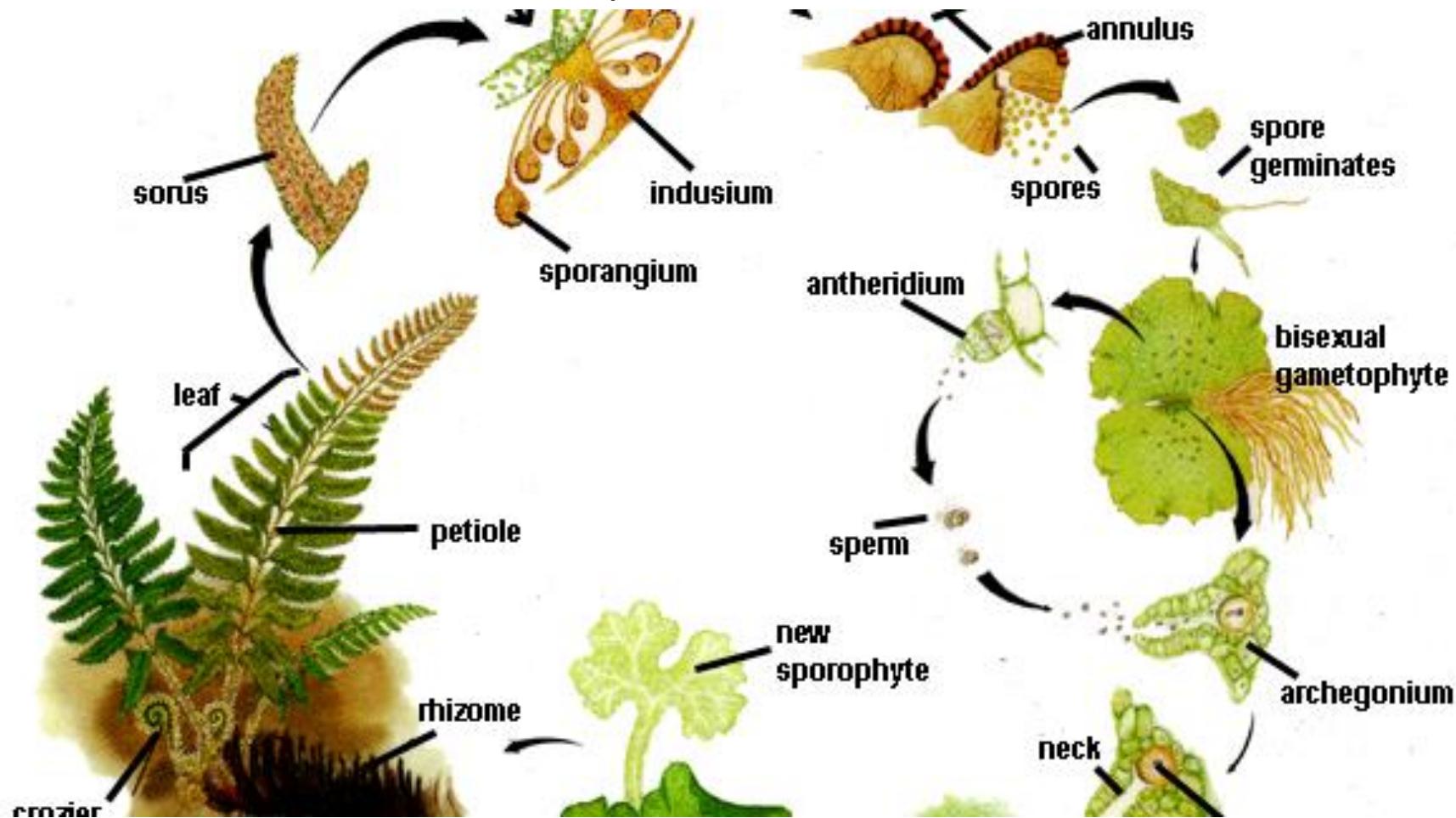
Starting on the lower left of the diagram, the regular fern plant is the sporophyte with fronds



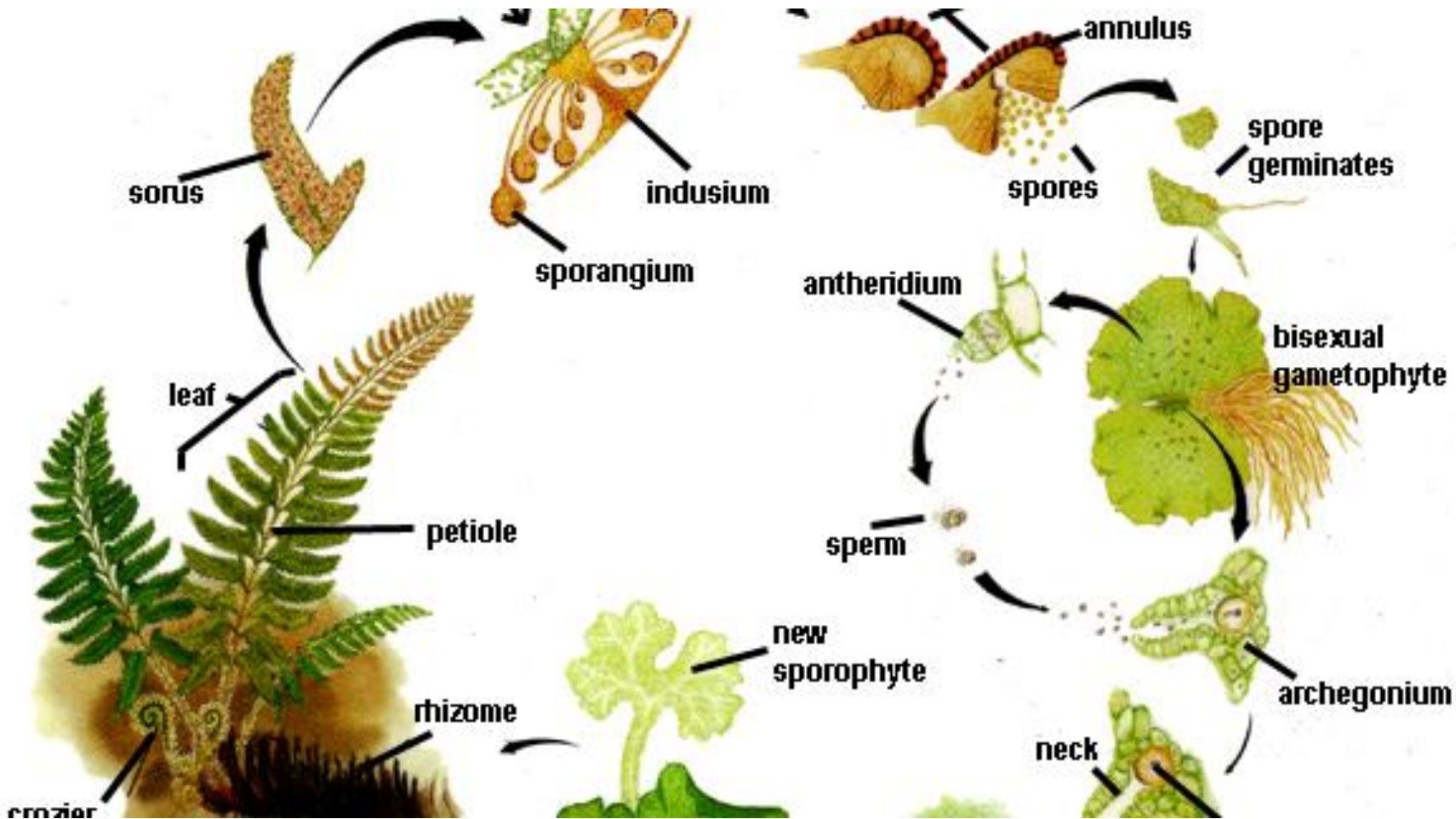
The arrow above shows a leaf segment or *pinna* with spore clusters or *sori* underneath. The next arrow points to a single sorus with sporangia in magnified view



the upper right hand corner shows magnified sporangia cracking open to shed spores, then below a spore germinating or growing, and below that the mature gametophyte called the *prothallus*.



The arrows issuing from the prothallus show an antheridium producing sperm and an *archegonium* with an egg. These are located on the bottom of the prothallus. The sperm swims through water to fertilize the egg.



Once the egg has been fertilized it grows into a baby fern sporophyte on the prothallus, which soon withers as the new fern plant develops. In real life, here is an old fern sporophyte of leather fern with many fronds.



Here are individual fronds of the leather fern. Note there are no sori on the top.



Here are young sori; notice the several egglike sporangia in each sorus, each is capable of producing many spores. The immature sporangia are pale yellow while, in the next slide...



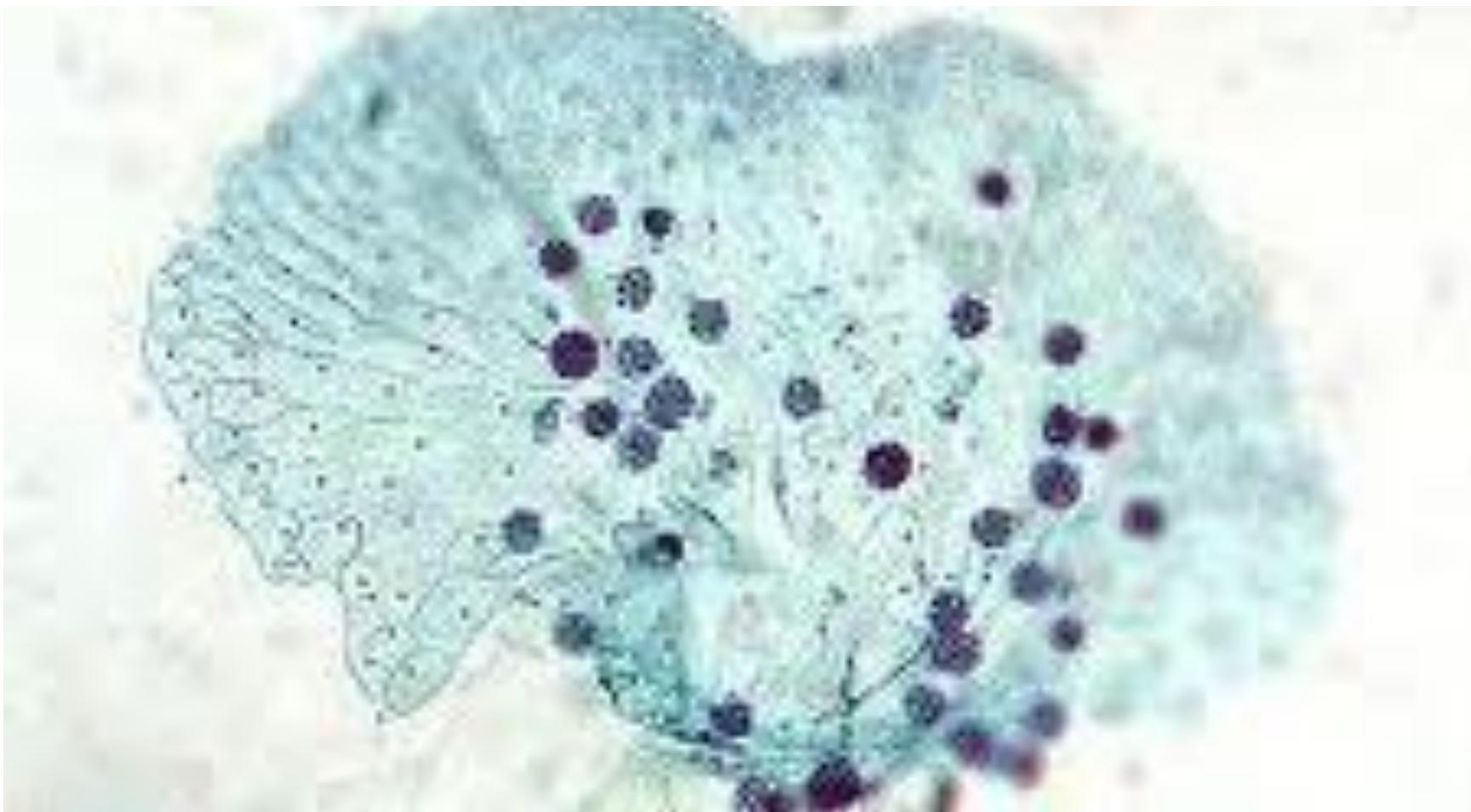
...the sporangia have turned brown and are mature. Notice the sori are not a single structure, as appears to the eye from a distance, but instead a dense cluster of spore bodies or sporangia



When the sporangia are ripe and filled with mature spores, they eject the spores under pressure into the air.

- The wind then blows the spores far and wide
- Only a few of the thousands of spores will land in a suitable new home to grow
- Successful spores settle down on a moist surface and grow into the gametophyte plant, known as the *prothallus*

Prothalli are the size of a thumb nail and heart shaped. This one has been turned upside down so you can see the sexual organs underneath (the dark purple spots). The male organs or *antheridia* produce sperm when there's water present



Underneath the prothallus lie many globe-shaped structures known as *antheridia*

- The antheridia each contain several coiled sperms awaiting a film of water
- The lid of the antheridium then pops off releasing the sperms into their watery medium
- In order to find the female structures, the *archegonia*, the sperms follow chemicals released by the archegonia

Meanwhile, embedded in the underside of the prothallus are the female organs or *archegonia*.

- Only the neck protrudes
- The neck is hollow in the center, allowing a passage way for the sperms to swim in
- At the bottom is a single egg waiting to be fertilized by a sperm
- The fertilized egg, now diploid, grows into a baby fern plant...

Here you see the necks of the fern archegonia



At the bottom of the photo lies the prothallus and growing out of it, a tiny new fern sporophyte with its first frond. It will take a year or more before the new plant makes its own sori.

